Reference Price Updating in the Housing Market

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Introduction

➢ This paper is the first to examine the dynamics of reference points in the housing markets.
➢ The convention is to use the original purchase price as the reference point, which explains sellers’ listing behavior by loss aversion (Genesove and Mayer 2001).
➢ I build a model of seller listing behavior that includes:
   1. reference points;
   2. down-payment constraints (Stein 1995);
   3. mortgage default option (Head, Sun, and Zhou 2023).
➢ Main Result: an observed “historical peak”, measured by the appraisal price from a refinance mortgage, serves as an updated reference point.
➢ To achieve this, I construct a novel dataset that tracks the transaction, financing, and listing history of over 97,000 U.S. residential properties.

Data and Reduced-Form Model

➢ Data: CoreLogic and Moody’s BlackBox Logic datasets.
➢ Reduced-Form Model: List price for property $i$ in census tract $n$, purchased at month $s$, refinanced at month $m$, and listed at month $t$ ($s < m < t$) is modeled as:

$$
\log Y_{i n s t} = \lambda_1 \text{Loss}_{i n s t} + \lambda_2 \text{Loss}_{i n s t} \cdot \text{APpraisedPrice}_{i n s t} + \delta \text{LTV}_{i n s t} + \tau_1 \log \text{Price}_{i n s t} + \tau_0 + \epsilon_{i n s t}
$$

➢ Loss: the greater value between the difference of the log of the reference price and the hedonic predicted price.
➢ LTV: the greater value between the difference of the Loan-to-Value ratio and 0.8, and zero.
➢ \( \text{LogPrice}_{i n s t} \): hedonic predicted price.

Reduced-Form Evidence

➢ A 10% increase in expected nominal loss to the refinancing appraised price leads a seller to set a 4.4% higher listing price.
➢ In contrast, a 10% increase in expected nominal loss to the purchase price results in a 0.1% higher listing price.
➢ Main Takeaway: The observed “historical peak” during sellers’ homeownership period serves as an updated reference point influencing their pricing strategy.

Conclusions

➢ This paper provides both empirical and quantitative evidence that an observed “historical peak”, measured by the appraisal price from a refinance mortgage, serves as an updated reference point.
➢ I extend Genesove and Mayer 2001 and find sellers are also loss averse in a housing boom period because reference price is adaptive.
➢ Model decomposition shows that loss aversion with reference price updating helps explain the price-volume correlation to a greater extent.

Table 1: Loss Aversion and Reference Point Updating

<table>
<thead>
<tr>
<th>Variable</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss: Appraised Price</td>
<td>0.466***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Loss: Appraised Price</td>
<td>-0.055***</td>
<td>0.466***</td>
</tr>
<tr>
<td>Loss: Purchase Price</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Loss: Purchase Price</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>LTV: 0%</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>LTV: 10%</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Estimated Value</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Estimated Value</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Estimated Price Index</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Estimated Price Index</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Residuals</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Residuals</td>
<td>-0.055***</td>
<td>-0.055***</td>
</tr>
<tr>
<td>Observations</td>
<td>91,826</td>
<td>91,826</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.891</td>
<td>0.881</td>
</tr>
</tbody>
</table>

Model and Estimation Results

➢ Each household is characterized by:
   1. nominal gains to reference price ($G_0$), $1$ or $2$ (i.e., original purchase price and refinancing appraised price, respectively);
   2. home equity position ($\ell$);
   3. random values capture seller motivation ($\epsilon$) and default cost ($c$).
➢ Households make three decisions: (1) listing decision ($s$), (2) listing premium ($f$), (3) default decision ($D$).
➢ The utility upon sale: $U(f, s) = P(f) + \lambda_1 \ell G_1(f) + \lambda_2 \epsilon G_2(f) - c \cdot P(f)$.
   1. $\eta$: the degree of reference dependent;
   2. $\lambda_1$: the degree of loss aversion;
   3. $c$: the down-payment penalty function.
➢ Trade-off: a higher listing premium ($f$) increases utility upon sale but decreases the probability of a sale ($P(s)$).
➢ Main Takeaway: sellers exhibit 2.5 higher degree of loss aversion to an observed “historical peak”, compared to the original purchase price. (Table 2)

Table 2: Structural Parameter Estimates

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>0.012</th>
<th>0.344</th>
<th>1.430</th>
<th>3.800</th>
<th>1.210</th>
<th>3.800</th>
</tr>
</thead>
</table>

References